

PHYSIKALISCHES KOLLOQUIUM

Wintersemester 2023/24

Das Kolloquium findet (soweit unten nicht anders angegeben) jeweils montags **jeweils montags um 17:15 Uhr online via Zoom** statt.

(Der jeweilige Link wird noch zur Verfügung gestellt.).

22.01.2024

Vorstellungsvortrag im Rahmen des Habilitationsverfahrens

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On the properties and applications of molecular interconversions

Abstract

The ability to change molecules in a controlled manner using external stimuli such as charge carriers or photons has fascinated the scientific community since the advent of nanoscience. One prominent example is isomerization, that is, the conversion of a molecule with a given shape into different atomic arrangement without changing its chemical formula. These switchable molecule modifications not only enable us to create reusable machine-like parts on the nanometer scale, but moreover to utilize the controlled switching as a nano scale detector for the incoming trigger.

Inspired by the detection of single-molecule switching observed in a scanning tunneling microscope (STM) [1], we developed and established the MOlecular NAnoprobe (MONA) technique [2]. Hereby, we use a single molecule as a detector for charge carriers, which are injected into the sample surface by the tip of an STM a few nanometers away from the molecule. The high spatial resolution of STM combined with the small size of the molecular detector allows for an atomic control of transport paths down to the single nanometer level.

I will present detailed insights into properties of a molecular detector and how the local environment can affect its switching characteristics [3]. Applying this technique to different molecule–substrate combinations, we have proven the capabilities of the novel MONA-technique, ranging from the influence of artificial [2] and natural occurring atomic structures [4] to the propagation of spin-polarized charge carriers in a Rashba-split surface state [5].

- [1] P. Liljeroth et al., Science 317, 1203 (2007)
- [2] M. Leisegang et al., Nano Lett. 18, 2165 (2018)
- [3] M. Leisegang et al., JPCC 124, 10727 (2020)
- [4] M. Leisegang et al., Phys. Rev. Lett. 126, 144601 (2021)
- [5] P. Härtl et al., Nano Lett. 23, 11608 (2023)

Für die Dozentinnen bzw. Dozenten der Fakultät

Prof. Dr. Assaad, Prof. Dr. Hinrichsen, Prof. Dr. Pflaum und Hr. Kuhr